

Claims

1. Apparatus for singulating flat articles which are transported on-edge as a stack (12) on a controllably driven conveyor (3) with a stack support (4) to the take-away station where the frontmost article (1) is taken away horizontally in a plane perpendicular to the feeding direction, having detectors projecting from the take-away reference plane (10) at different heights for determining the position of the frontmost article (1) at particular contact pressures which are connected to the drive controller of the conveyor (3), the conveyor (3) and the stack support (4) being driven in a separately controlled manner, characterized in that supporting elements can be individually moved horizontally in a plane perpendicular to the take-away reference plane using actuators (7,8,14) and the detectors for measuring the position of the frontmost article (1), which are also provided for measuring the stack pressure, and that the drives of the actuators (7,8,14) of the conveyor (3) and of the stack support (4) can be controlled as a function of the ascertained position of the frontmost article (1) in such a way that when the stack (12) is transported to the take-away station the frontmost object (1), supported by the supporting elements, is fed to the take-away station virtually parallel to the take-away reference plane (10) with low stack pressure measured by the detectors at which it does not yet tip over or become deformed.
2. Apparatus according to claim 1, characterized in that the control of the drives of the detectors with their actuators (7,8,14), of the conveyor (3) and of the stack support (4) ensure the following sequence of operations:  
- after take-away of the article (1), moving of the detectors with their actuators (7,8,14) out of the take-away reference plane (10) in the direction of the in-fed stack (12) until at least two detectors detect the now frontmost article (1) of the stack (12),

- determining the position of the detected article (1) and controlling the drives of the actuators (7,8,14), of the stack support (4) and of the conveyor (3) in such a way that the end of the stack facing the take-away station is aligned parallel with the take-away reference plane (10) and is transported in the aligned state, held between the detectors and the stack support (4), with low defined stack pressure, to the take-away station,

- shortly prior to take-away of the frontmost article (1), retracting of the detectors to behind the take-away reference plane (10).

3. Apparatus according to claim 2, characterized in that the detectors with their actuators (7,8,14) are disposed at more than two different heights so that any bulging of the frontmost article (1) can also be determined which is then eliminated by selective actuator control (1).

4. Apparatus according to claim 1, characterized in that the stack support (4) is pivotally mounted on a linear guide (5), the pivoting axis being horizontally oriented in a plane perpendicular to the take-away direction and the pivoting device (25) being controllable in such a way that the front articles in the stack (12) viewed from the take-away station are fed in the required vertical orientation.

5. Apparatus according to claim 1, characterized in that distributed over the length of the articles (1) in the stack (12) there are provided a plurality of detectors with actuators (7A,8A and 7B,8B) disposed one above the other.

6. Apparatus according to one of claims 1, 2, 3 or 5, characterized in that, using the drive control, jogging movements of the detectors with variable amplitude, frequency and force can be generated.

7. Apparatus according to claim 1, characterized in that there are one or more sensing rollers (9) rotatable in the take-

away direction at the tips of the detectors.

- 5 8. Apparatus according to claim 1, characterized in that the detectors with the actuators (7,8,14) consist of linear motors (15) with an integrated position measuring system (18), the motor current being used for force measurement.
- 10 9. Apparatus according to claim 1, characterized in that the detectors with the actuators (7,8,14) consist of linear motors (15) with an integrated position measuring system (18), a force measuring device being fixed to the head of the armature (17) of the linear motor (15).
- 15 10. Apparatus according to claim 8, characterized in that as a force measuring device there is provided a linearly displaceable ball (23) biased by means of a spring (24), which ball triggers a switching signal in response to a particular force.